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GENERAL MILLS, INC.
Mechanical Division
2003 E. Hennepin Avenue
Minneapolis 13, Minnesota

PROJECT SKYHOOK
by
R. F. Mautner and C. P. Merrell

FINAL REPORT
Projects 85022 and 85023
1 September 1953 to 31 July 1954
Contract No. Nour 875(00) Annex I.

Submitted to
Office of Naval Research
Washington 25, D. C.

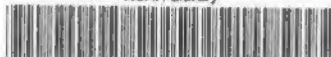
Approved by: J. E. Barkley
J. E. Barkley
Head, Chemistry and Physics Research

Submitted by: J. R. Smith
J. R. Smith

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Report No. 1434
Date: 19 July 1955
Project: 85022 and 85023

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I. AIMS

On May 22, 1953, Contract Nonr 875(00) between GMI and the Office of Naval Research was amended to provide for the launching of "Skyhook" plastic balloons to carry scientific instruments to high altitudes. Scientific payloads were supplied by the Physics Departments of various universities also under contract to the Office of Naval Research. General Mills supplied "Skyhook" balloons, balloon controls and safety equipment. Engineering services for launching and altitude information were also supplied by General Mills technical personnel.

II. WORK ACCOMPLISHED

Flight work on this project was carried out from September, 1953 through July, 1954. Twenty-one flights were made in this period: Flights 1058, 1059, 1071 through 1083, 1135, 1152, 1153, 1154, 1181, and 1211. In addition, flight service consisted of obtaining International Civil Aviation Operation clearance, gas metering and inflation, and launching assistance. Tracking and recovery was provided for three flights flown during the field trip to Saskatoon, Saskatchewan, Canada. Another field trip made on this project was to the vicinity of the Galapagos Islands on the geomagnetic equator. Remaining for further work and constructed under this contract were four 85' balloons and two 128' Tapeless Tailored balloons (one ducted and one non-ducted).

A summary of flight data follows.

<u>Flight No.</u>	<u>Scientific Group</u>	<u>Balloon</u>	<u>Para-chutes</u>	<u>Altitude Control</u>	<u>Telemeter</u>	<u>Load Release</u>
1058	U. of Wash. J. J. Lord	733	28'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1059	U. of Minn.	85	28'	None	Supplied by U. of Minn. (Olland cycle)	Dual Timers
1071	NYU and U. of Minn Neuberg, Anderson	851E	24'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1072	NRL-Stiller	85	24'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1073	U. of M. Anderson	85	24'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1074	U. of M. Danielson	85	24'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1075	Bartol McClure	85	24'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1076	NYU Neuberg	WRI73	28'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1077	U. of Chicago U. of Wash. Schein-Lord	WRI73	28'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1078	NYU Neuberg	WRI73	28'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers
1079	NRL Stiller	85	28'	None	2 mc Dual Bellows Drum Type Code- sonde	Dual Timers

<u>Flight No.</u>	<u>Scientific Group</u>	<u>Balloon</u>	<u>Para-chutes</u>	<u>Altitude Control</u>	<u>Telemeter</u>	<u>Load Release</u>
1080	Bartol McClure	85	28'	None	2 mc Dual Bellows Drum Type Code-sonde	Dual Timers
1081	U. of M. Danielson	85	28'	None	2 mc Dual Bellows Drum Type Code-sonde	Dual Timers
1082	U. of M. Anderson	85	28'	None	2 mc Dual Bellows Drum Type Code-sonde	Dual Timers
1083	U. of M. Schein	85	28'	None	2 mc Dual Bellows Drum Type Code-sonde	Dual Timers
1135	U. of Chicago M. Schein U. of Iowa M. Gottlieb	1161	30'	Constant level steel-shot 93,000'	2 mc Dual Bellows Drum Type Code-sonde	Radio Command & Dual Timers
1152	U. of Minn. E. P. Ney	1161	24'	Supplied by U. of Minn. (Follow-up)	Supplied by U. of Minn. (Oiland cycle)	Dual Timers
1153	CNR Hitch-hike	85	2-12'	None	2 mc Dual Bellows Drum Type Code-sonde	Dual Timers
1154	U. of Minn. E. P. Ney	131TT	24'	Supplied by U. of Minn.	Supplied by U. of Minn.	Dual Timers
1181	CNR Hitch-hike	791	2-12'	None	2 mc Dual Bellows Drum Type Code-sonde	Dual Timers
1211	U. of Chicago M. Schein U. of Iowa M. Gottlieb	128TT	30'	Follow-up control, steel shot	2 mc Dual Bellows Drum Type Code-sonde	Radio Command & Dual Timers

III. SUCCESS

All 1.5, 2, and 2.5 balloons flown were successful. Their average rates of rise ranged from 616 to 992 fpm and their floating altitude varied from 84,000 to 98,300 ft.

Three of the four 1 mil balloons failed. One Winzen 73' balloon failed from apparent cold brittleness fracture (see T-A #A-21194-A) and was not recovered, having landed 4.5 miles inland on a very rugged island of volcanic rock. Two GMI 85' balloons failed from apparent atmospheric turbulence (see TA's #A-21229-A and A-21202-B). One GMI 85' 1 mil balloon made a successful flight for NRL (Flight #1082). In all flights the cold brittleness temperature was exceeded by a minimum of 16°C. with the exception of Flight 1082 which failed at 42,000 ft. at -58°C.

Flight 1058 leaked gas and floated slowly down from approximately 60,000 feet and was lost by the tracking plane and truck as the winds at 200 to 300 mb level carried it faster than its ability to follow. It is estimated to be lost in the vicinity of Peoria, Illinois.

Flight 1059 burst on night ascent for the probable reason of atmospheric turbulence. The instruments were recovered, although the premature drop was at night.

Flights 1071 through 1083 were accomplished with a variety of balloons. This was due to the extreme urgency of the contract, which allowed insufficient lead time for obtaining materials. Use was made, therefore, of balloons on hand, balloons available from Winzen Research, and balloon materials presently in the plant on other contracts.

Flight 1181's timers did not function and therefore the load did not

release. Recovery was reported in the vicinity of Ogaki, Ontario, although tracking ceased on the second day in western South Dakota. As yet, the flight equipment has not been received at GMI's laboratory.

Flights 1152, 1153, and 1154 were launched from Saskatoon, Saskatchewan. The first flight performed very successfully, although the balloon leveled off low due to air being accepted at approximately 90,000 feet. The second and third were failures due to holes in the balloon. Although the hole was discovered in the third balloon before launching and was patched, the patch apparently did not hold because of a concentration of stress at the point of application of the patch and the balloon descended after reaching 78,000 feet. The remaining two flights, 1135 and 1211, were flown with practically identical loads and are of great interest for comparison of non-ballasted balloon performance at sundown of "air stabilized" versus "ducted appendix" design. It is interesting to note that at this altitude, the stratosphere (much more stable) contributes greatly to the ducted balloon's stability after sunset. It is reasonable to assume, therefore, that all future work done at 10 mb or less pressure-altitude would benefit in altitude and stability by utilization of one of several methods of "check valve" appendix design. Both performed successfully, although each was accompanied by ballasting instrument failure and the total ballast was consumed before sunset on each flight.

Flight data from all flights are presented in the following section, Appendix A.

General Mills, Inc. is happy to have been able to work with the personnel of the Office of Naval Research in carrying out these high altitude scientific experiments.

FLIGHT DATA

APPENDIX "A"

1 GMI BEACON 1724 KC DBD S-31

FLIGHT NO. 1058
FLOWN 28 DEC. 1953
FOR 8 5023
LOAD ON BALLOON 1365
FREE LIFT 100%
BALLOON TYPE NUMBER MATERIAL WEIGHT
733 BH 395 ARL #147 167#

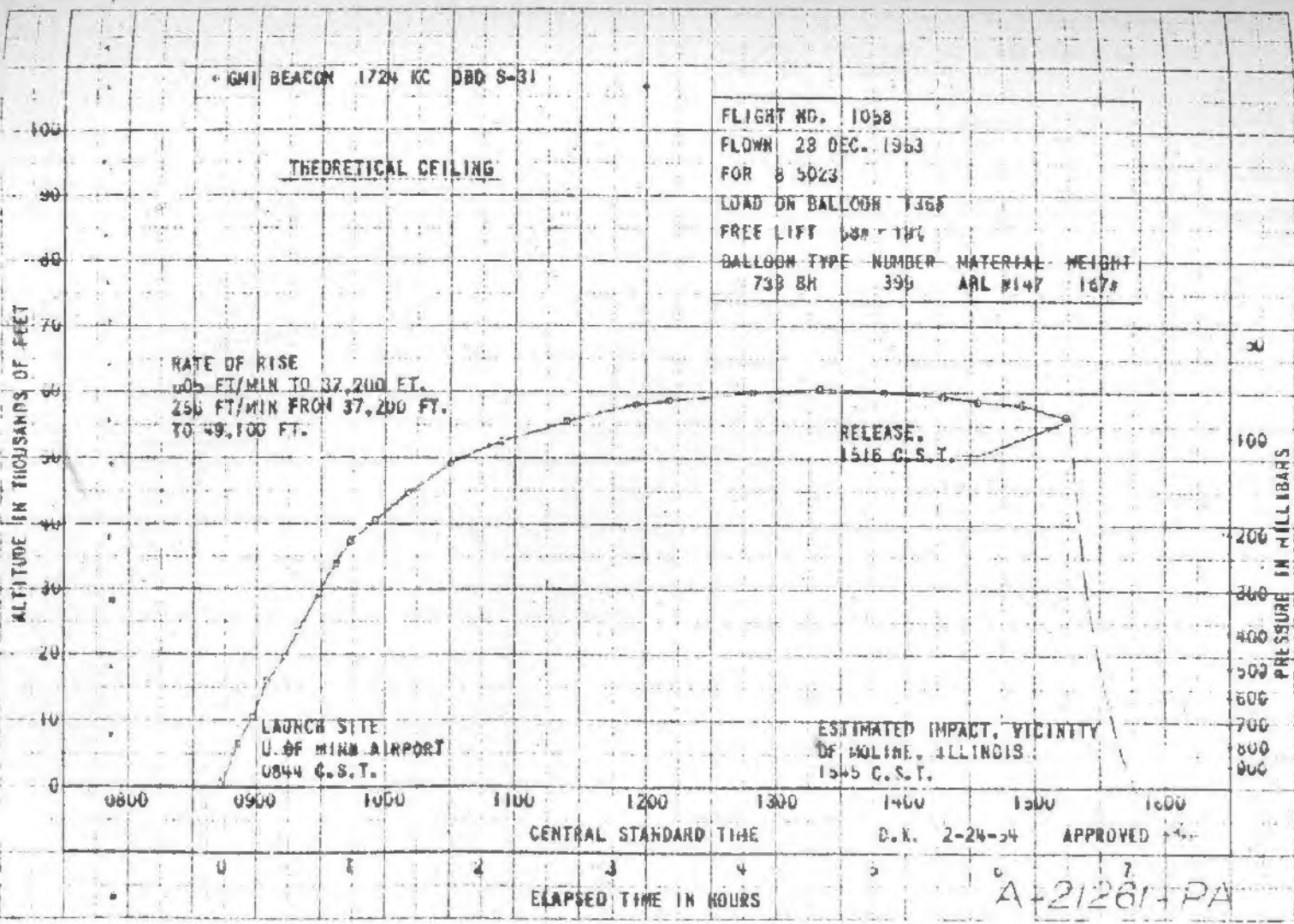
THEORETICAL CEILING

RATE OF RISE
405 FT/MIN TO 37,200 FT.
255 FT/MIN FROM 37,200 FT.
TO 49,100 FT.

RELEASE.
1516 C.S.T.

LAUNCH SITE
U. OF MINN. AIRPORT
0844 C.S.T.

ESTIMATED IMPACT, VICINITY
OF MOLINE, ILLINOIS
1545 C.S.T.



JUL 29 1955

BAROGRAPH NO 51219

SCHEDULED DURATION: 10.8 HRS FROM 2.00
DURATION: 2 HRS 5 MIN

THEORETICAL CEILING 86,300

BALLOON BURST
BELIEVED DUE
TO TURBULENCE

FLIGHT NO. 1059

FLYING 15 JAN 54 U/M CERENKOV COUNTER
FOR 8 BOXES

LOAD ON BALLOON 444.5#

FREE LIFT 86.8# = 14.7%

BALLOON TYPE	NUMBER	MATERIAL	WEIGHT
85	23	ARL 3322	1815#

RATES OF RISE
IN FT / MIN

701

642.9

577

0205 C.S.T.
LAUNCH SITE
U OF M AIRPORT

EST. IMPACT AT
0410.8 MI SE
CATANBA, WIS

0200

ELAPSED TIME IN HOURS

0300

0400

11.4. 16 APRIL 54

APPROVED

CENTRAL STANDARD TIME

GENERAL MILLS, INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPARTMENT, MINNEAPOLIS, MINN.

A-11277-A

JUL 29 1955

ALTITUDE DATA
4 GMT 000 CODE BEACON 47, 472400

THEORETICAL CEILING

TELEMETRY ENCLOSED IN RED
POLYETHYLENE ENVELOPE.
GREENHOUSE EFFECT CAUSED
TEMPERATURE ERROR IN HIGH
ALTITUDE BELLOWS.

RATE OF RISE
907 FT/MIN
TO 80,700 FT

FREE AIR TEMPERATURE DATA
FROM USS CURRITUCK, 070300Z

LAUNCH SITE
00° 16.3'S, 90° 16.8'W
FROM USS CURRITUCK AT 0721

SCHEDULED ORIENTATION 2.5 HOURS FROM 0700

ASSUMED FLIGHT PATH

LOAD RELEASE,
1521

FLIGHT NO 1072
FOR 6 SC22 NAVAL RESEARCH LABORATORY
FLOWN 7 SEPT 1953
LOAD ON BALLOON 149#
FREE LIFT 25# ± 6"
BALLOON TYPE NUMBER MATERIAL WEIGHT
80 10 ARL-200 10#

IMPACT IN PACIFIC OCEAN
01° 07'S, 97° 50'W
AT 1802

ELAPSED TIME IN HOURS

O.R. 1-24-53

APPROVED

LOCAL STANDARD TIME (30°W)

4-21235-B

GENERAL MILLS TRAIL ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

JUL 29 1953

ALTITUDE DATA
 HGM OBN CODE BEACON #16 174415
 #U OF MINNESOTA DOUBLE CYLIND CYCLE

ACTUAL DURATION UNKNOWN
 SCHEDULED DURATION 4 HOURS FROM 0830

TIMER FAILED, TRACKING ABANDONED 1842

THEORETICAL CEILING

SIGNAL FADEN, 1240

TELEMETRY ENCLOSED IN RED
 POLYETHYLENE ENVELOPE.
 GREENHOUSE EFFECT CAUSED
 TEMPERATURE ERROR IN HIGH
 ALTITUDE BELLOWS.

FREE AIR TEMPERATURE DATA
 FROM USS CURTIS, 0°0300Z

RATE OF RISE
 795 FT/MIN
 TO 83,600 FT

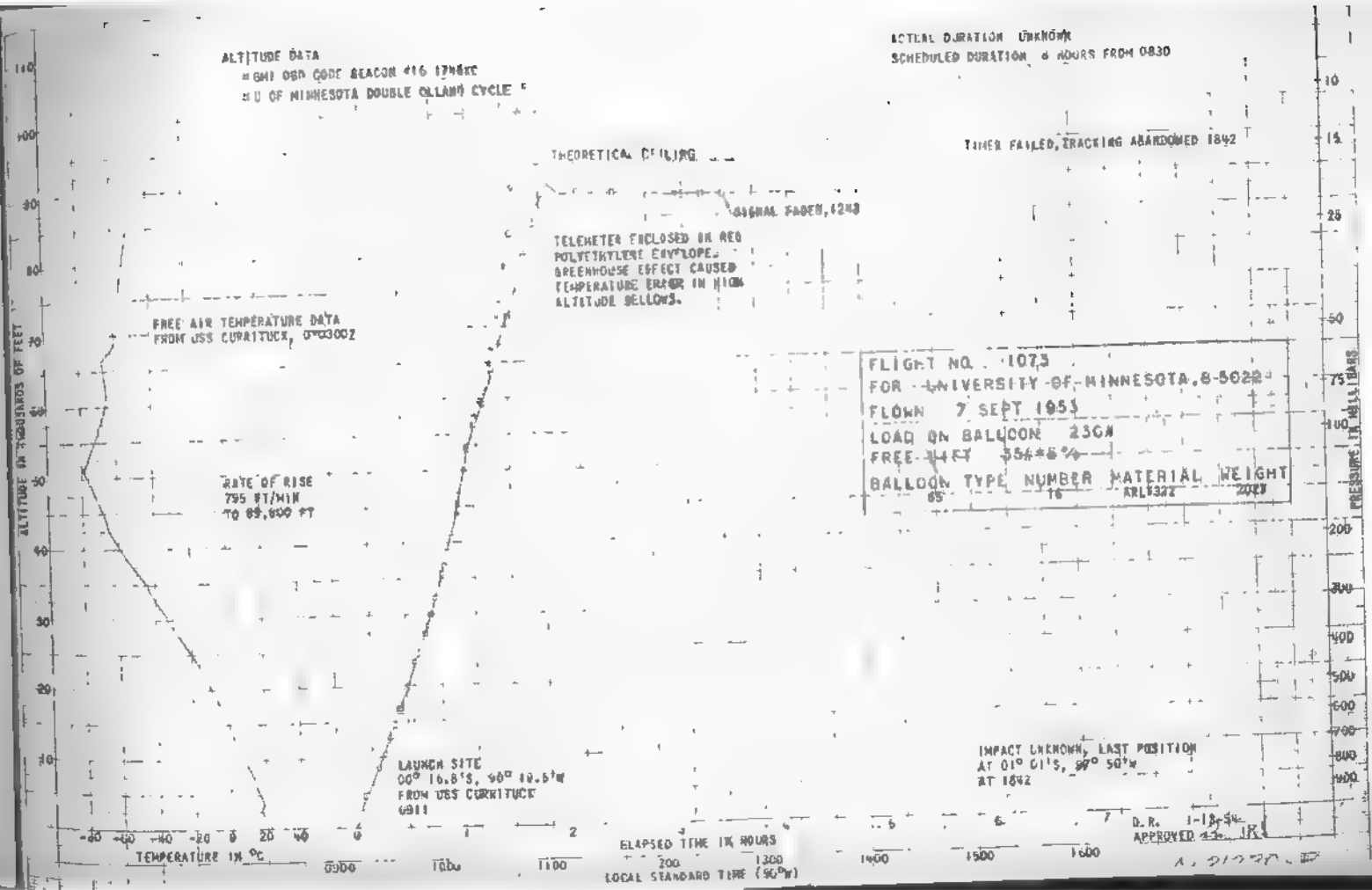
FLIGHT NO. 1073
 FOR UNIVERSITY OF MINNESOTA, 6-5022
 FLOWN 7 SEPT 1953
 LOAD ON BALLOON 250N
 FREE LIFT 354#5%
 BALLOON TYPE NUMBER MATERIAL WEIGHT
 65 16 AR1322 2073

LAUNCH SITE
 00° 16.8'S, 90° 12.5'W
 FROM USS CURTIS
 0911

IMPACT UNKNOWN, LAST POSITION
 AT 01° 01'S, 90° 50'W
 AT 1842

D.R. 1-18-54
 APPROVED J.S. JR.

ELAPSED TIME IN HOURS
 200 1300
 LOCAL STANDARD TIME (GMT)



ALTITUDE DATA
 * GMI DSD CODE BEACON #3 1724KC
 THEORETICAL CEILING

DURATION TO RELEASE 4.2 HOURS
 SCHEDULED DURATION 8.5 HOURS FROM 0700

ESTIMATED LOAD
 RELEASE, 1925

FREE AIR TEMPERATURE DATA
 FROM USS CURRITUCK, 060300Z

RATE OF RISE
 641 FT/MIN
 TO 90,000 FT

FLIGHT 1074
 FOR 65022 UNIVERSITY OF MINNESOTA
 FLOWN 8 SEPT 1953
 LOAD ON BALLOON 164g
 FREE LIFT 33% = 10%
 BALLOON TYPE NUMBER MATERIAL WEIGHT
 83 16 ARL-322 108g

LAUNCH SITE
 00° 17.4' S, 10° 19.3' W
 FROM USS CURRITUCK
 0712

IMPACT IN PACIFIC OCEAN AT
 00° 31.8' S, 96° 26.7' W
 AT 1600

TEMPERATURE IN °C

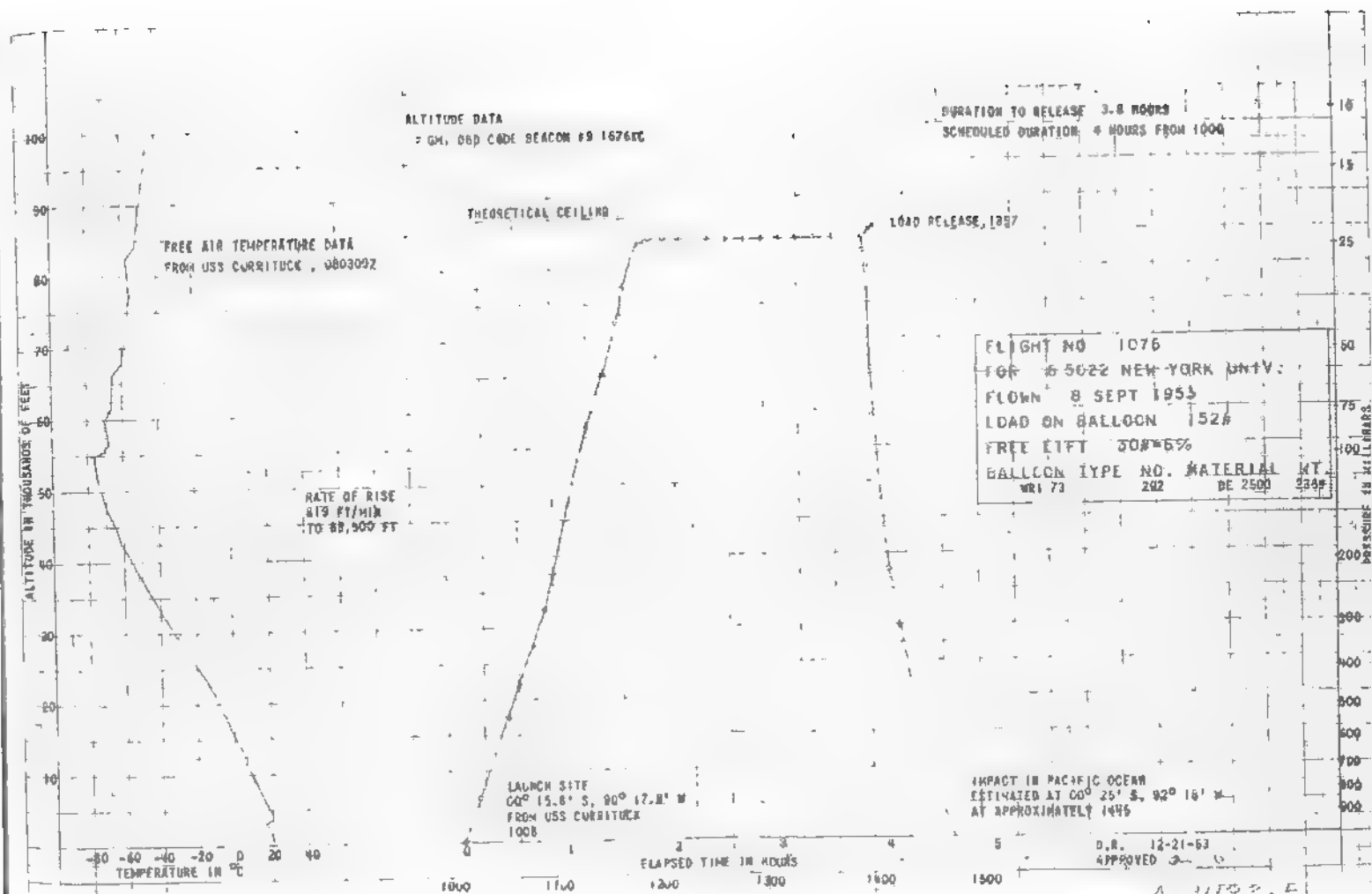
ELAPSED TIME IN HOURS

D.R. 12-23-53 APPROVED

LOCAL STANDARD TIME (20°N)

A 21224-5

PRESSURE IN MILLIBARS



ALTITUDE DATA
 *GHI DBD CODE BEACON #18 1746K6

DURATION TO RELEASE 6.3 HOURS
 SCHEDULED DURATION 6 HOURS FROM 0900

THEORETICAL CEILING

FREE AIR TEMPERATURE DATA
 FROM USS CURATUCK 080300Z

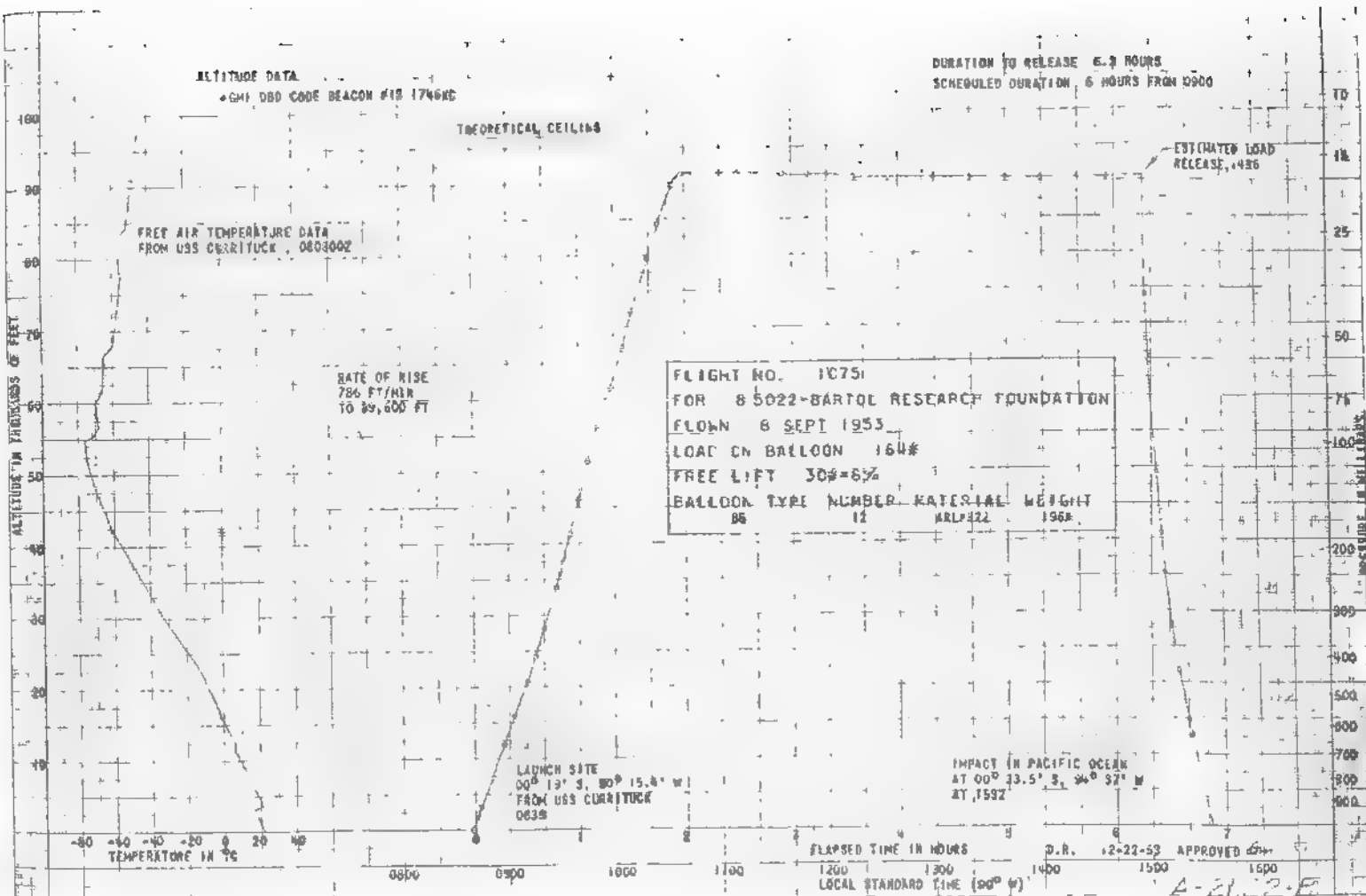
RATE OF RISE
 786 FT/MIN
 TO 39,600 FT

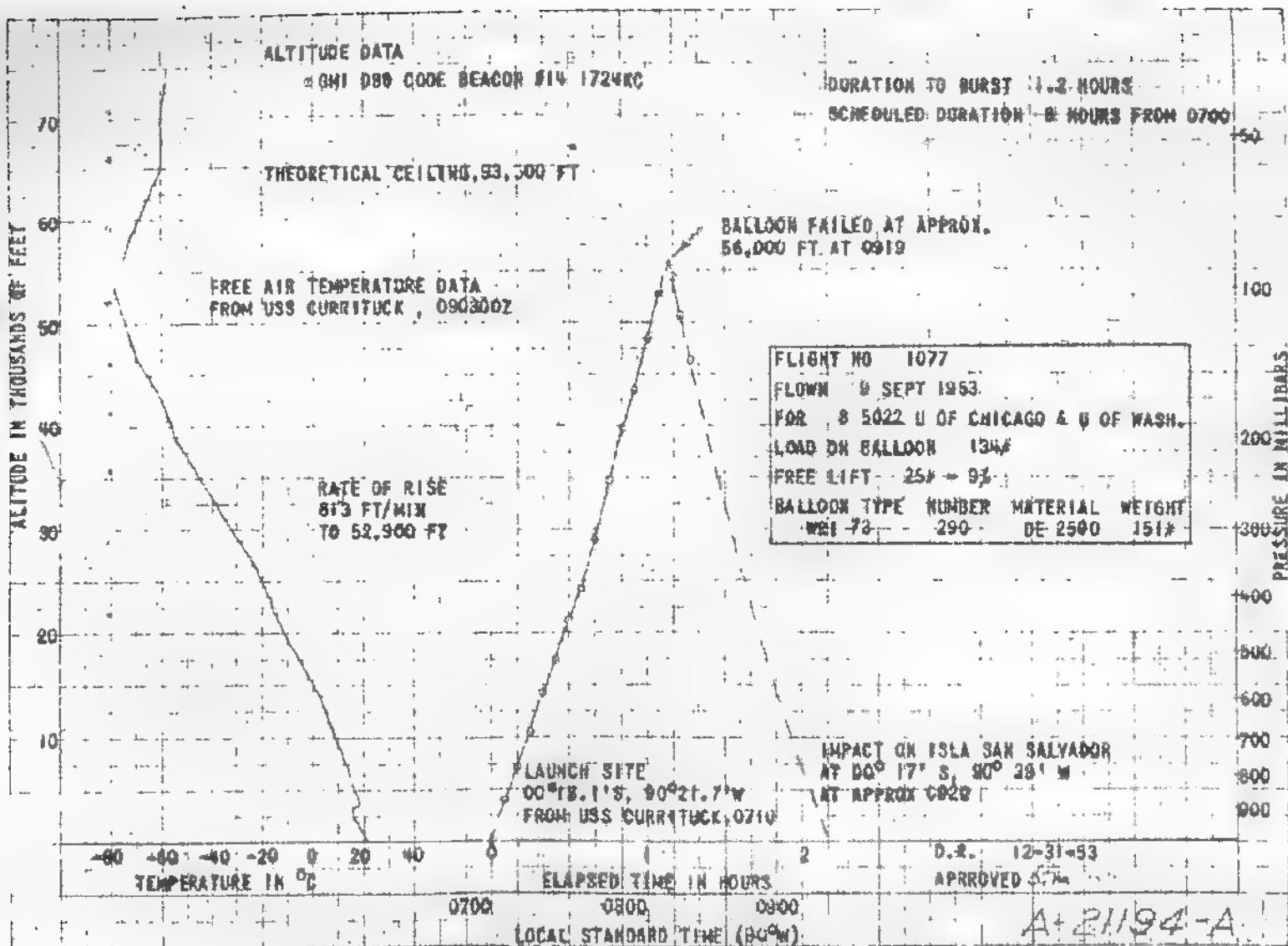
ESTIMATED LOAD
 RELEASE 1436

FLIGHT NO. 10751
 FOR 85022-BARTOL RESEARCH FOUNDATION
 FLOWN 6 SEPT 1953
 LOAD ON BALLOON 164#
 FREE LIFT 30%-8%
 BALLOON TYPE NUMBER MATERIAL WEIGHT
 B6 12 ARL 122 196#

LAUNCH SITE
 00° 13' S, 80° 15' W
 FROM USS CURATUCK
 0839

IMPACT IN PACIFIC OCEAN
 AT 00° 33.5' S, 94° 32' W
 AT 1552



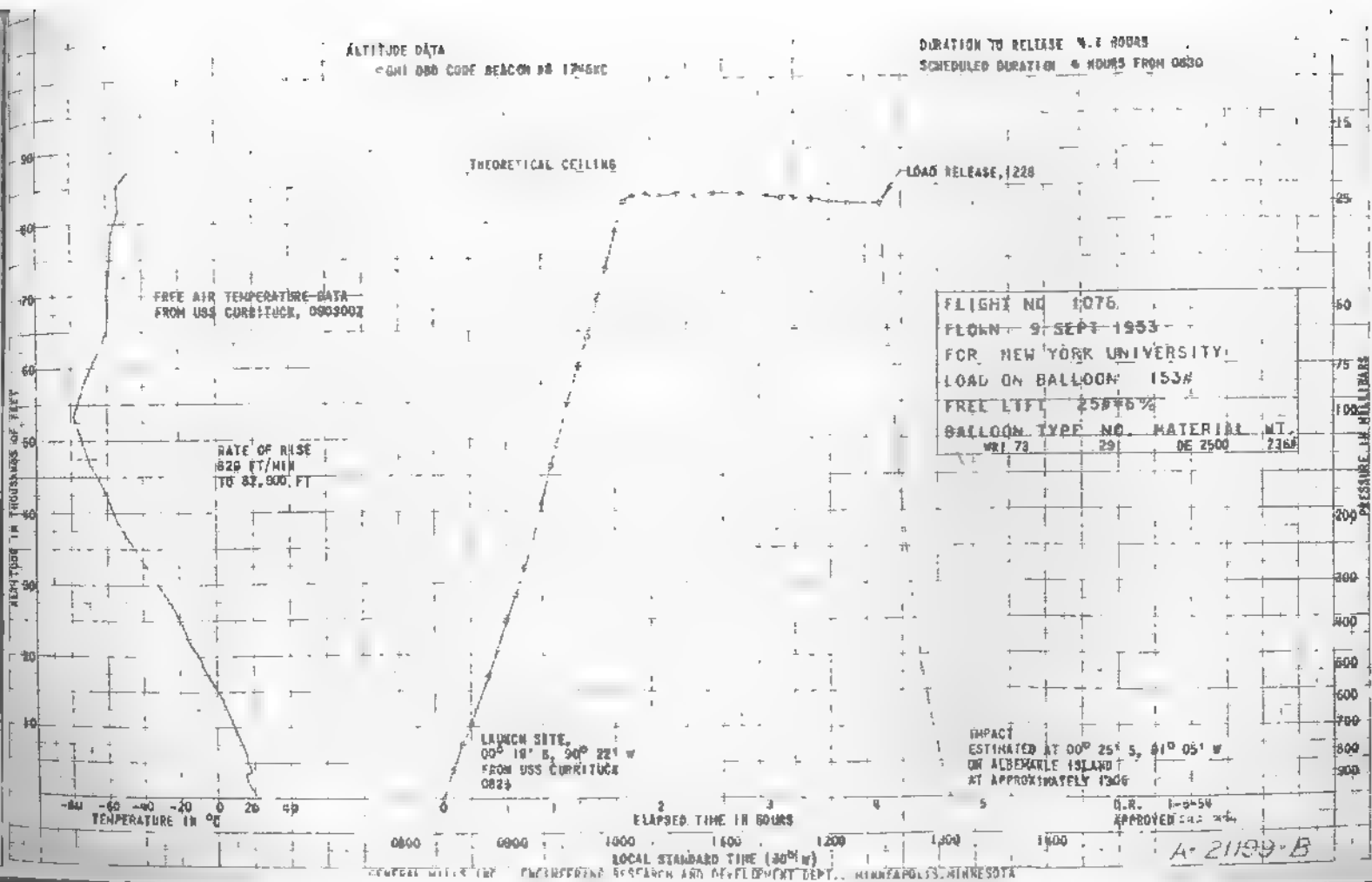


GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

JUL 29 1955

ALTITUDE DATA
-GHI 080 CODE BEACON 98 1246K

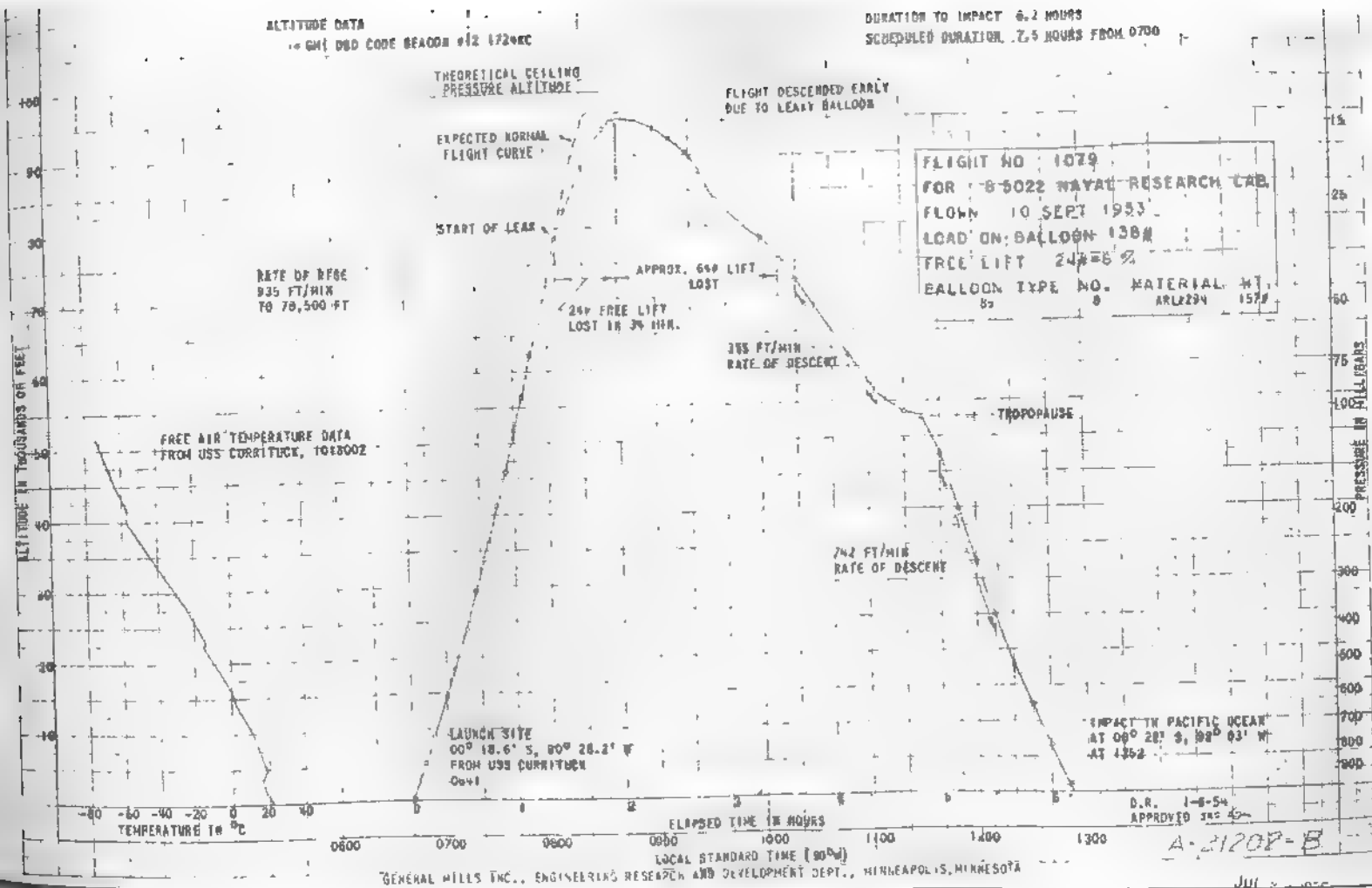
DURATION TO RELEASE 4.2 HOURS
SCHEDULED DURATION 4 HOURS FROM 0830



RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

ALTITUDE DATA
 GHI DSD CODE BEACON #12 1724KC

DURATION TO IMPACT 6.2 HOURS
 SCHEDULED DURATION 7.5 HOURS FROM 0700



ALTITUDE DATA
 • GHI DSD CODE BEACON #11 1676K0

DURATION UNKNOWN
 SCHEDULED DURATION 7 HOURS FROM 0600

THEORETICAL CEILING

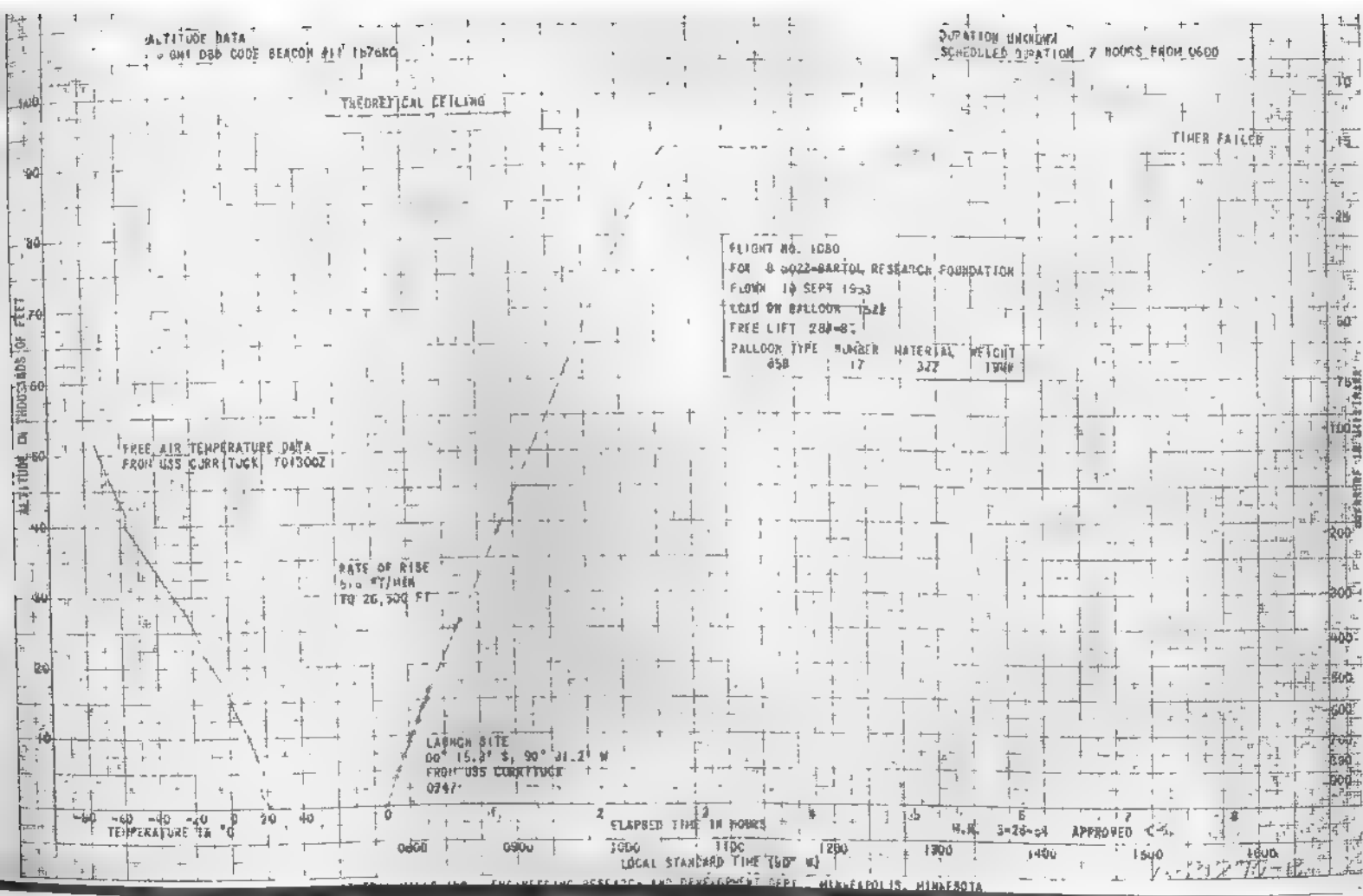
TIMER FAILED

FLIGHT NO. 1080
 FOR S-0022-BARTOL RESEARCH FOUNDATION
 FLOWN 14 SEPT 1953
 LOAD ON BALLOON 1528
 FREE LIFT 280-8
 BALLOON TYPE NUMBER MATERIAL WEIGHT
 858 17 327 1344

FREE AIR TEMPERATURE DATA
 FROM USS CURT (TUG) 701300Z

RATE OF RISE
 510 FT/MIN
 TO 26,500 FT

LAUNCH SITE
 00° 15.3' S, 90° 31.2' W
 FROM USS CURT (TUG)
 0747



ENGINEERING RESEARCH AND DEVELOPMENT DEPT. MINNEAPOLIS, MINNESOTA

ALTITUDE DATA
 GHI DRD CODE BEACON #2 1724KC

DURATION TO RELEASE 2.5 HOURS
 SCHEDULED DURATION 8 HOURS FROM 0630

THEORETICAL CEILING

LOAD RELEASE,
 1429.5

RATE OF RISE
 1806 FT/MIN
 TO 60,600 FT

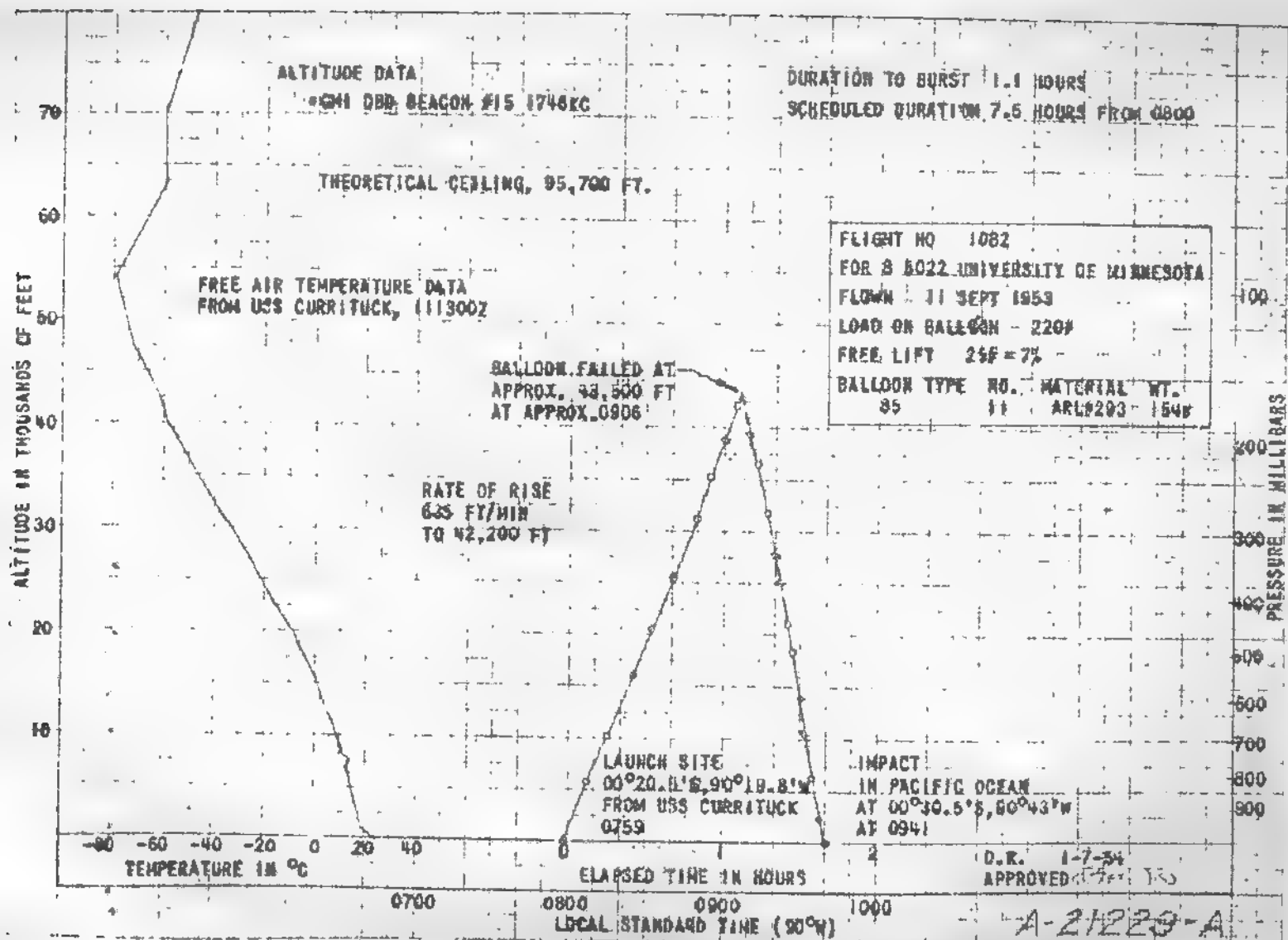
FREE AIR TEMPERATURE DATA
 FROM USS CURRITUCK, 111300Z

FLIGHT NO 1C68
 FOR 85022-UNIVERSITY OF MINNESOTA-
 FLOWN 11 SEPT 1953
 LOAD ON BALLOON 145M
 FREE LIFT 33#-10%
 BALLOON TYPE NUMBER MATERIAL WEIGHT
 85 14 ARJ322 2019

LAUNCH SITE
 00° 21.0' S, 90° 20.5' W
 FROM USS CURRITUCK
 0630

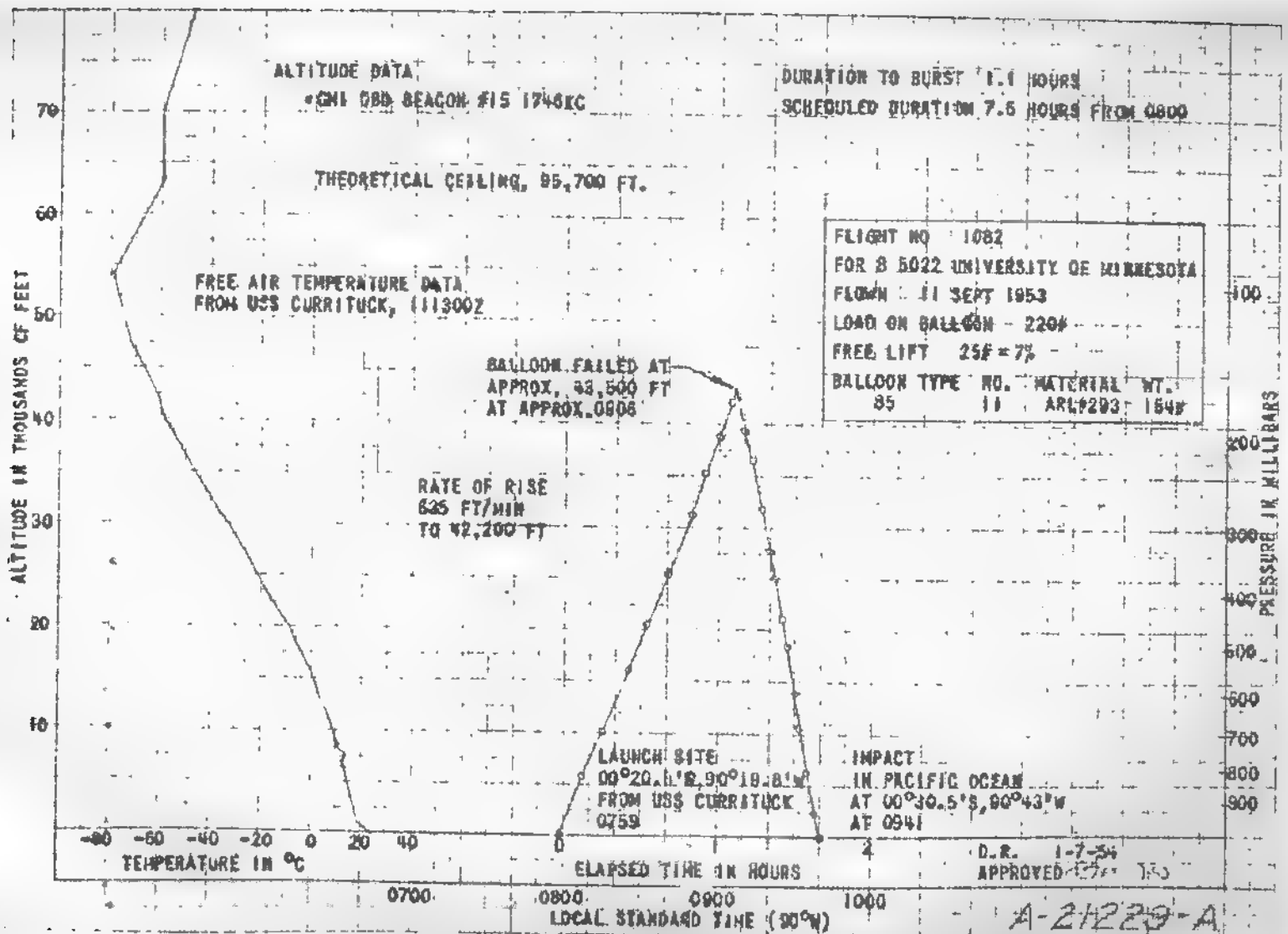
IMPACT IN PACIFIC OCEAN
 01° 21.0' S, 95° 14.5' W
 AT 1500

ELAPSED TIME IN HOURS
 1000 1100 1200 1300 1400 1500
 LOCAL STANDARD TIME (90°W)
 D.R. 1-7-54 APPROVED 31-54
 1406 1500
 4-21228-B



GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

JUL 29 1955



GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

JUL 29 1955

ALTITUDE DATA
 * GHI 000 CODE BEACON # 1746K

DURATION TO RELEASE 2.4 HOURS
 SCHEDULED DURATION 2 HOURS FROM 0630

LOAD RELEASE,
 1948

THEORETICAL CEILING

RATE OF RISE
 994 FT/MIN
 TO 37,300 FT

FREE AIR TEMPERATURE DATA
 FROM USS CORBITTUCK, 121800Z

FLIGHT NO 1063
 FOR 8 5622 UNIVERSITY OF CHICAGO
 FLOWN 12-SEPT 1948
 LOAD ON BALLOON 1771#
 FREE LIFT 203#-05
 BALLOON TYPE NUMBER MATERIAL WEIGHT
 85 13 ARL 322 187#

LAUNCH SITE
 00° 21.7' S, 90° 16.5' W
 FROM USS CORBITTUCK
 0629

IMPACT IN PACIFIC OCEAN
 00° 00', 90° 54' W
 AT 1332 NOT RECOVERED
 DUE TO DARKNESS

TEMPERATURE IN °C

ELAPSED TIME IN HOURS

M.L. 1-2-54

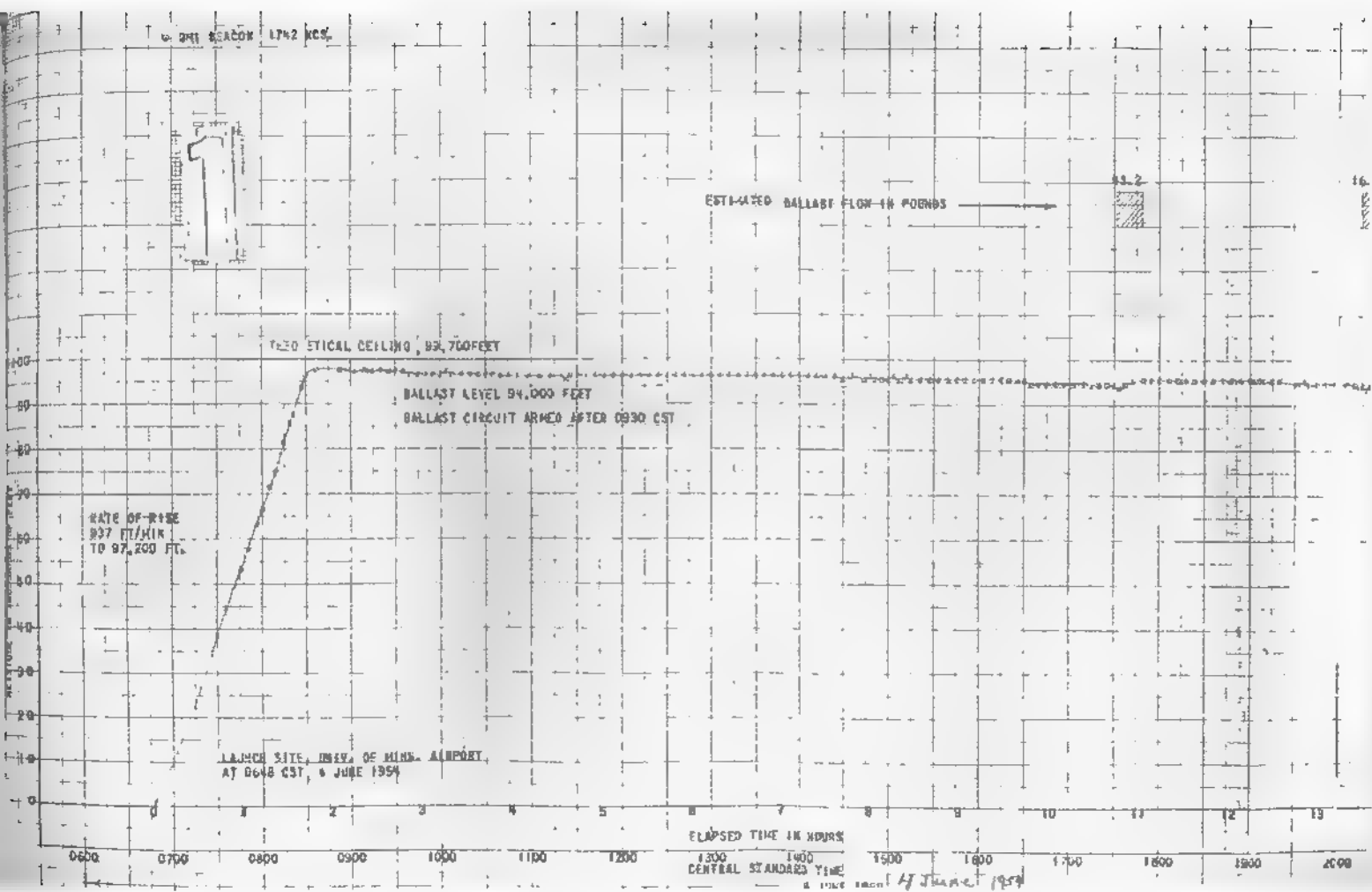
APPROVED 1440

LOCAL STANDARD TIME (90°W)

1440 1900
 A-21263-B

GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

U.S. GOVERNMENT



SCHEDULED DURATION 2610 HOURS
ACTUAL DURATION 25.4 HOURS

FLIGHT NO. 1135;
FLOW 8 JUNE 1954
FOR TS 5023
LOAD ON BALLOON 1369.58
FREE LIFT 1002.155

BALLOON TYPE NUMBER MATERIAL WEIGHT
1161A 20 ASL 1333 298.758
0.0013"

BALLAST 750' 810' STEEL SHOT
FLOW RATE 2.4 LB/MIN (0.97% GROSS LIFT/MIN)

TOTAL BALLAST (70 LBS.) EXPENDED BEFORE 2041 CST
BY OVER CONTROL

ESTIMATED SURGE ON BALLOON
2042 CST

ESTIMATED SURGE ON BALLOON
0421 CST

LOAD RELEASED
BY 0710 G.S. 140
AT 0422 CST

2

IMPACT 8 MI. SW
HOBBSIDE, S.D.
0646 CST
8 JUNE 1954

ELAPSED TIME IN HOURS

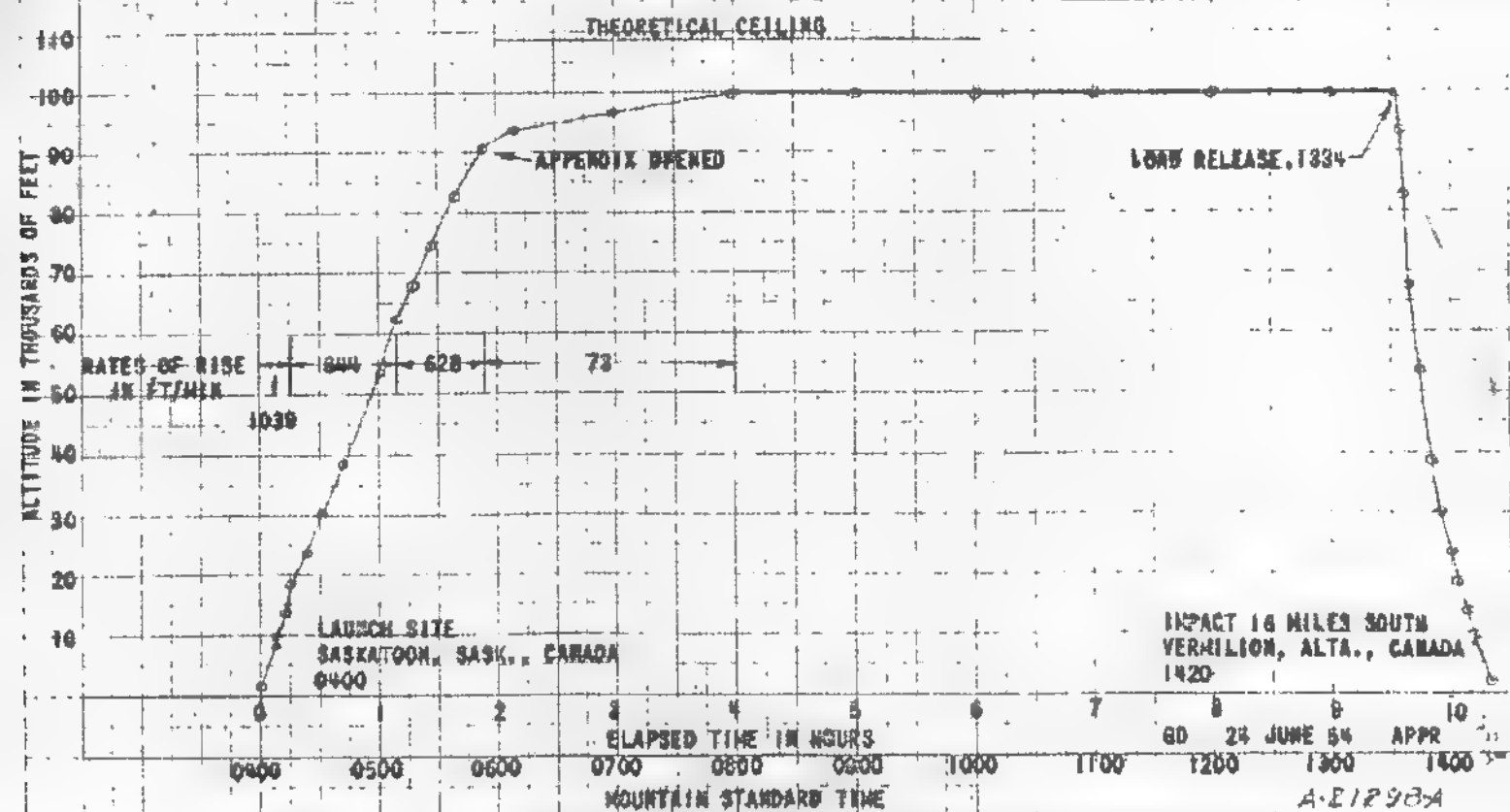
0100 0200
CENTRAL STANDARD TIME

APPROVED

1-21-54-D

ALTITUDE DATA
BAROGRAPH NO. MBS 1058

FLIGHT NO. 1152
 FLOWN 23 JUNE 54
 FOR S 5023
 LOAD ON BALLOON 122F
 FREE LIFT 75F = 185
 BALLOON TYPE NO. MATERIAL WT.
 1161 A 30 ARL #322 291A



GENERAL MILLS INC., ENGINEERING RESEARCH & DEVELOPMENT DEPT., MINNEAPOLIS, MINN.

A-E1298A

JUL 29 1955

ALTITUDE DATA

INS 272 BAROGRAPH

1746 KC CODESONDE BEACON

FLIGHT NO. 1153

FLOWN 6 JUNE 1954

FOR # 5623

LOAD ON BALLOON 8F

FREE LIFT 44% 18%

BALLOON TYPE	NUMBER	MATERIAL	WEIGHT
B2	7	ARL294	1854

THEORETICAL CEILING 105,800 FT

RATE OF RISE
706 FT/MIN
TO 8100 FT
483 FT/MIN
FROM 8100 FT
TO 13,800 FT

LAUNCH SITE
SASKATOON, SASK.
0511 CST

LEAK IN BALLOON
CAUSED EARLY DESCENT

IMPACT, 2 MI. SW
MENNON, SASK.
0614 CST

D.R. 5 NOV 54
APPROVED

ELAPSED TIME IN HOURS

0500

0600

CENTRAL STANDARD TIME

A-21300A

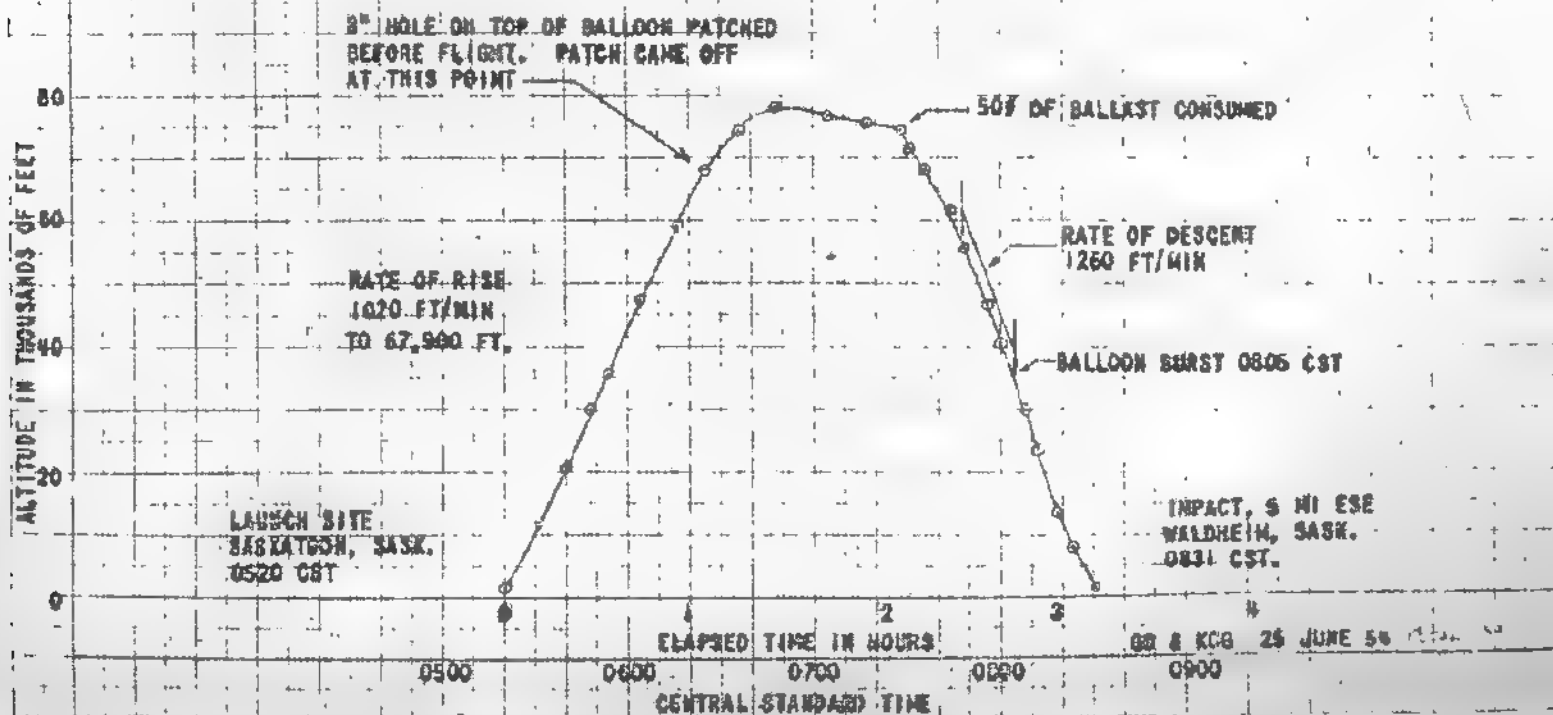
GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINNESOTA

JUL 29 1955

ALTITUDE DATA
• BAROGRAPH MMS 1056

THEORETICAL CEILING 115,550 FT.

FLIGHT 1154		
FLOWN 15 JUNE 1954		
FOR 8 5023		
LOAD ON BALLOON 153#		
FREE LIFT 80.6# = 20%		
BALLOON TYPE	NUMBER	MATERIAL WEIGHT
131M TT	1	ARI #320 256.5#
		& #294



GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINN.

ALTITUDE DATA
+ 950 CODESOUND BEACON 7.1, 1746 BC

THEORETICAL CEILING

TIMER FAILED

ESTIMATED SHWS

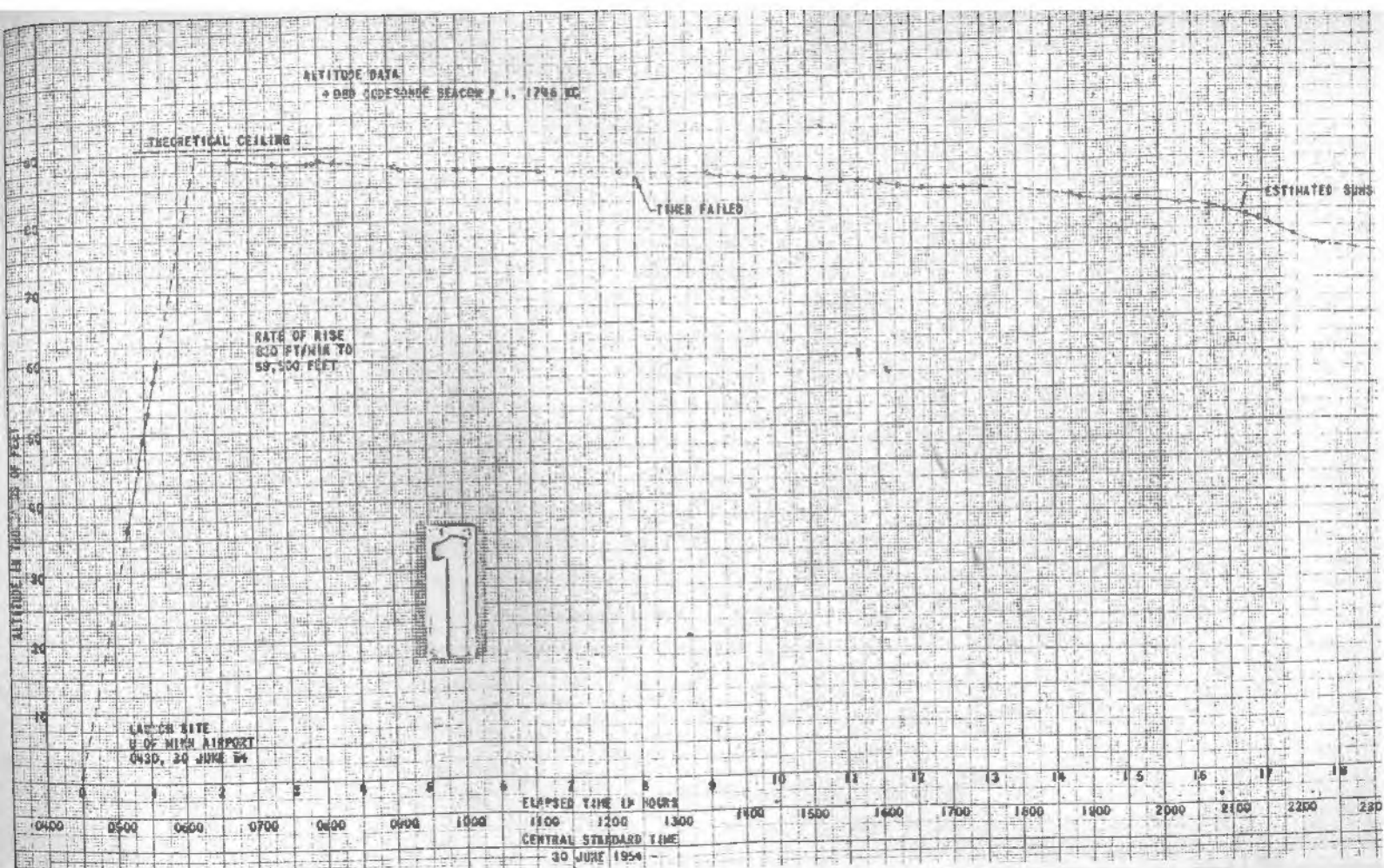
RATE OF RISE
810 FT/MIN TO
59,500 FEET

LAUNCH SITE
H OF MICH AIRPORT
ONSD, 30 JUNE 54

ELAPSED TIME IN HOURS

CENTRAL STANDARD TIME

30 JUNE 1954



2

ESTIMATED SUNSET ON BALLOON, 2312

ESTIMATED SUNRISE ON BALLOON, 0440

SIGNAL F.

FLIGHT NO. 130
 FOR 25023
 FROM 20 JUNE 1955
 LOSS ON BALLOON 7.2
 TIME LEFT 652 P. 15A
 BALLOON TYPE BUOYER 1726140 METAL
 700 15 201/327 2400

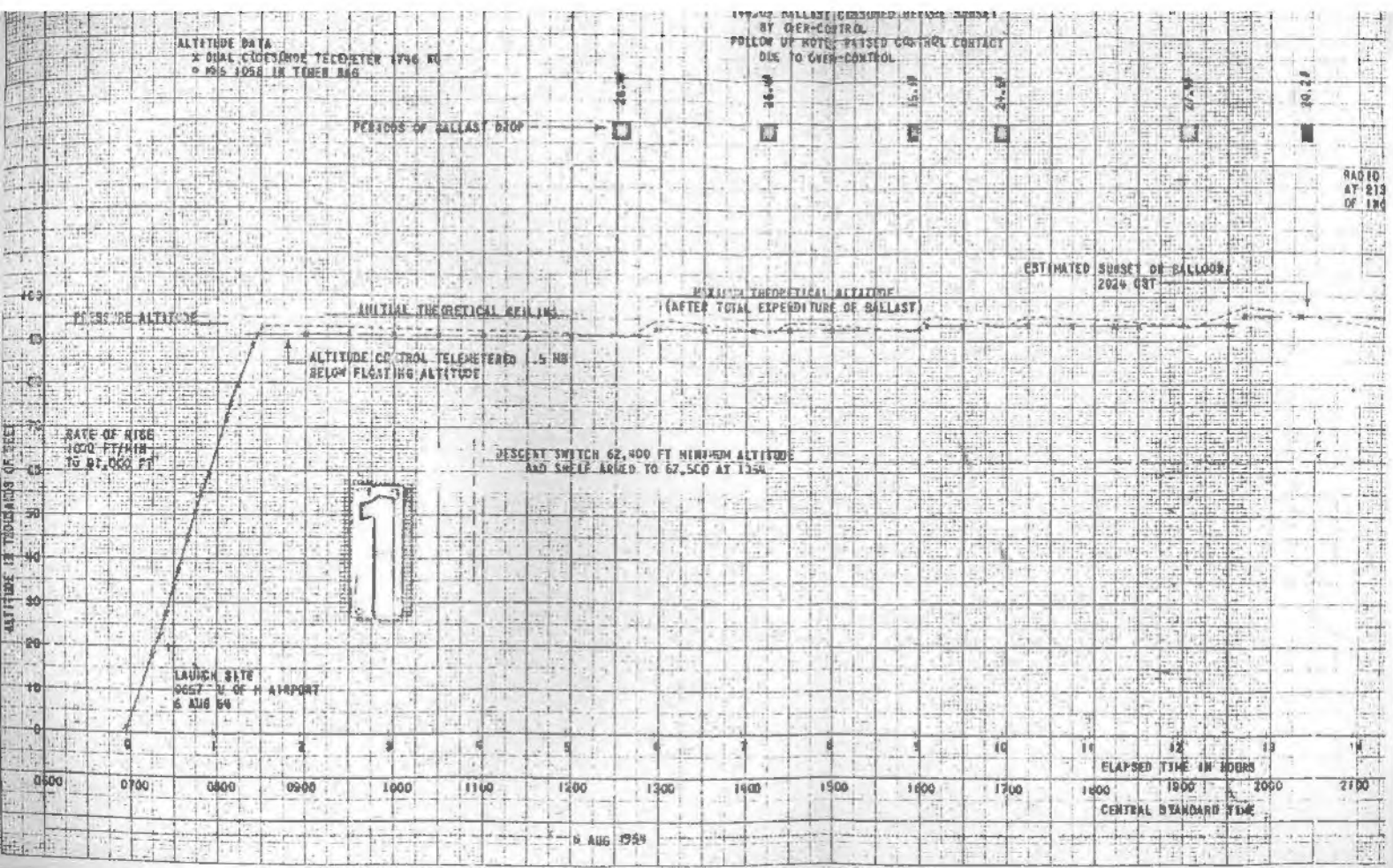
NO RECOVERY
 IMPACT UNKNOWN

ELAPSED TIME IN HOURS
 CENTRAL STANDARD TIME

D.R. 24 JAN 55 APPROVED 1100 1200 1300

1 JULY 1954

A 21510-D
 29 1955



SCHEDULED DURATION 25.5 HOURS
ACTUAL DURATION 27.2 HOURS

RADIO RELEASE TRANSMITTER OPERATED AT WPLS.
AT 2138G. LOAD DID NOT RELEASE BECAUSE
OF INCORRECT SET DISTANCE.

TELEMETRY STOPPED 2135 WHEN BATTERY
DRAIN TOOK CONTINUOUS OPERATION OF
OF BALLAST VALVE AFTER 2025.

2

LOAD RELEASE
BY ELECTRIC FINDER
DID NOT

ESTIMATED SUBRISE ON BALLOON.
0910 CST

FLIGHT NO. 1211
FLOW 6 AUG 954
FOR 0.5033
LOAD ON BALLOON 528.04
FREE LIST 1105 = 125
BALLOON TYPE NUMBER MATERIAL WEIGHT
128' TAILED TAPELESS 494315 3547
0.24 MIL POLYETHYLENE
82' DOCT
BALLAST 1400 TROX SHOT
FLOW RATE: 2.4 LB/MIN (0.275 GROSS LOAD/MIN)

IMPACT
1042 15 ENE
REVELL S DAK
7 AUG 54

ELAPSED TIME IN HOURS

CENTRAL STANDARD TIME

7 AUG 1954

APPROVED

D. F. C. 201

A-21379-D